2013 UDOT RESEARCH PROBLEM STATEMENT

****** Problem statement deadline is March 25, 2013. Submit statements to Steve Bagley at sbagley@utah.gov ******

Problem Title: Evaluation of concrete sealants **No. : UT-13.01.07**

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UDOT Champion (suggested):

Select a Subject Area

- ☒ Materials/Pavements
- ☐ Maintenance
- ☐ Traffic Mgmt/Safety
- ☐ Geotechnical
- ☐ Preconstruction
- ☐ Planning/Asset Mgmt
- ☐ Transportation Innovation

1. Describe the problem to be addressed.

This research will address the performance of concrete sealers when used in Utah. Deicing salts and/or similar products are commonly broadcast over bridge decks during winters. The resulting chloride ion saturated solution can penetrate into the concrete and the ions can corrode the reinforcing bars. The use of concrete deck and crack sealants is one method to prevent ion intrusion. Although sealants are commonly used throughout the United States, including in Utah, little is known about their performance. Furthermore, the effectiveness of sealants exposed to cycles of freezing and thawing is unknown.

2. Describe why this research is important and how it is unique.

This research is important because it will quantitatively evaluate the performance of concrete sealants when used in Utah. Paragraph A of Article 2.1 of UDOT Section 03393 was recently replaced. The original approved material was a low viscosity, low modulus, two-component, epoxy based system while the new approved material is a low viscosity, low modulus polymer or high molecular weight methacrylate (HMWM) system. Such a change prompted engineers to ask several questions including "Is a HMWM system the best concrete surface and crack sealer system available?" "Could a HMWM system and a silane system be used in combination: the HMWM as the crack sealer and the silane as the surface sealer?" Questions such as these need to be answered and this research will attempt to answer them. This research will focus on the performance of concrete sealants to be used specifically in Utah. Such an evaluation will provide UDOT Engineers specific-to-Utah data to help during the decision making process. An effective sealant can prolong deck life, saving UDOT a significant amount of money.

This research is unique in two ways: it will test concrete sealants on Utah deck materials and it will determine the performance of these sealants under cycles of freezing and thawing.

3. List the research objective(s) to be accomplished:

Determine the effectiveness and relative performance of commercially available concrete sealants when used in Utah.

4. List the major tasks to accomplish the research objective(s):

1. Conduct a comprehensive literature review
2. Determine the sealants to be tested
3. Cast specimens. Two types of specimens will be used: those for concrete surface sealants and those for crack sealants
4. Submit specimens to freeze-thaw cycles
5. Determine specimens resistance to chlorine ion intrusion
6. Write report summarizing findings

5. List the deliverable(s) to come to UDOT from this research study:

A final research report and a final oral presentation

6. Describe how the results of this study will be implemented at UDOT.

The evaluation will provide UDOT engineers specific-to-Utah data to help during the decision of what product or combination of products is more effective to seal concrete decks and cracks.

7. Estimated cost - Total: $120,000 **UDOT Share:** $120,000 **Other/Matching Funds:** $0

8. Outline the proposed schedule for this study, including estimated start date, duration, and major event dates.

The proposed duration of this project is 24 months. Months 1 to 6: tasks 1 and 2 will be completed; months 7 to 12: task 3 will be completed and task 4 will be initiated; months 13-18: task 4 will be finished and task 5 will be initiated; months 19 to 24: tasks 5 and 6 will be completed.